Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions	)	WT Docket No. 12-268
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	)	

COMMENTS OF GE HEALTHCARE

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GE Healthcare ("GEHC") submits these comments in response to the Public Notice ("PN") issued by the Federal Communications Commission ("FCC") on May 17, 2013 in the above-captioned proceeding.[1] As the Commission knows, GEHC is a leading provider of systems that use Channel 37 to provide wireless medical telemetry services ("WMTS") in support of healthcare facility patient monitoring. In light of its decades of experience in the medical telemetry marketplace, GEHC submits these comments regarding: (1) the dangerous interference that the PN's proposal to potentially locate mobile uplink services adjacent to Channel 37 could cause, to the detriment of healthcare facilities and patients alike; and (2) the additional protections the Commission should adopt for Channel 37 WMTS in the context of a Down from 51 band plan.

I. THE PUBLIC NOTICE'S PROPOSAL TO POTENTIALLY LOCATE MOBILE UPLINK SERVICES ADJACENT TO CHANNEL 37 WOULD RESULT IN LIFE-THREATENING INTERFERENCE TO WMTS SYSTEMS

[1] Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Public Notice*, GN Docket No. 12-268, (rel. May 17, 2013)("Public Notice").

In its order creating the WMTS in 2000, the FCC declared that a specific allocation for WMTS was needed "to protect the public safety by providing spectrum where medical telemetry equipment can operate without interference."[2] Since then, the number and uses of WMTS systems have exploded, with thousands of hospitals and hundreds of thousands of patients depending on their perfectly reliable operation. Recognizing that the need to protect Channel 37 WMTS operations is greater now than ever, the record in this proceeding reflects a growing consensus in favor of the "Down from 51" band plan proposed by Verizon, T-Mobile, AT&T, Qualcomm and the National Association of Broadcasters.[3] This plan, which GEHC supports, protects Channel 37 WMTS operations by placing mobile uplink spectrum as far away from Channel 37 as possible. Instead of embracing this consensus plan, GEHC is disappointed to see that the Commission is still considering a band plan, Down from 51 Reversed, that would likely result in significant and dangerous interference to Channel 37 WMTS operations and has no support in the record.

To the extent that the Down from 51 Reversed[4] or Down from 51 TDD[5] band plans place mobile uplink operations near Channel 37, they risk disastrous consequences for WMTS devices. There are millions of portable devices in use, which will inevitably be taken inside healthcare facilities. Once inside, they will be sending and receiving signals within only a few feet of WMTS antennas.[6] Even though mobile handsets transmit at a lower power than mobile base stations and DTV broadcast towers, their ubiquity and operation near Channel 37 inside

[2] Amendment of Parts 2 and 95 of the Commission's Rules to Create a Wireless Medical Telemetry Service, *Report and Order*, ET Docket 99-255, 15 FCC Rcd 11206, at ¶ 11 (2000).
[3] *See, e.g.*, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Comments of Verizon and Verizon Wireless*, WT Docket No. 12-268 (filed Jan. 29, 2013); Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Comments of Qualcomm Incorporated*, WT Docket No. 12-268 (filed Jan. 25, 2013).
[4] Public Notice at 3-5.
[5] *Id.* at 5-6.
[6] Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Comments of GE Healthcare*, at 25, WT Docket No. 12-268 (filed Jan. 25, 2013) ("GEHC Comments").

healthcare facilities would cause the in-hospital field strength of mobile handsets to be far greater than that of DTV broadcast facilities.[7] As GEHC previously noted, the fundamental emissions received from a Part 27 portable device transmitting at only one meter separation from a WMTS system antenna would exceed the estimated adjacent channel blocking threshold for WMTS systems by more than 44 dB.[8] Signals at that level could cause blocking interference to WMTS systems even if the handsets were transmitting several channels away from Channel 37.[9]

It is unfortunately not possible to avoid this interference through geolocation-based management tools, geographic separation, or spectrum sensing technologies. First, geolocation-based tools would be unworkable because monitoring all WMTS locations would be a far more arduous task than tracking broadcast towers.[10] In contrast to the relatively static number of broadcast towers, there are an estimated 200,000 WMTS devices operating on Channel 37 and that number is growing rapidly at an average annual rate of 11.5%.[11] To further complicate the task of tracking, the registered locations of the WMTS systems are not necessarily the locations of the actual deployments and the location information is not routinely updated or maintained in real time, despite the frequent expansion of WMTS systems into new areas.[12] For the same reasons, a geographic separation scheme would be unsuccessful. Given the inability to precisely track WMTS device locations, the margin of error necessary for effective geographic separation would have to be quite large. The resulting exclusion zones would cover vast areas of urban centers, limiting the benefit of the new spectrum. Finally, spectrum sensing technologies are not yet sufficiently developed to offer a practical solution. The Commission noted in 2008 that these

[7] Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Reply Comments of GE Healthcare*, at 24, WT Docket No. 12-268 (filed Mar. 12, 2013)("GEHC Reply Comments").
[8] *Id.*
[9] *Id.*
[10] *Id.* at 18.
[11] GEHC Comments at 6-7.
[12] GEHC Reply Comments at 18.

technologies were not sufficient to protect wireless microphones.[13] Certainly, then, they cannot be sufficient to protect WMTS operations, where patient health and safety are at issue. Fundamentally, these mitigation strategies, even if extremely effective (*e.g.* 99.999%), would still result in many cases of interference when applied to millions of mobile devices.[14] Given the potentially life-threatening consequences of even temporary interference to Channel 37 WMTS systems, even such limited interference constitutes an unacceptable risk.

Nor is it practical to harden WMTS devices to withstand such interference. Designed to operate with potential exposure only from the fewer than 80 DTV stations nationwide transmitting on channels adjacent to Channel 37, most WMTS devices are based on Narrow Band Frequency Modulation technology, using unidirectional communication with no retransmission of data to correct errors.[15] They offer only forward error correction that cannot adjust for significant interference.[16] WMTS sensitivity to interference is exacerbated by the fact that WMTS units use distributed antenna systems that deploy hundreds of antennas throughout the healthcare facility.[17] This renders them vulnerable to reciprocal mixing of signals, which are created from near proximity to adjacent channel transmission, such as would occur when a mobile handset were brought into healthcare facilities.[18] In addition, a single source of

[13] *See* Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, *Second Report and Order and Memorandum Opinion and Order*, 23 FCC Rcd 16807, 16876 ¶ 198 (2008).

[14] For the same reasons, GEHC urges the Commission not to permit unlicensed use of Channel 37. The proponents of sharing Channel 37 with unlicensed devices rely on the same geolocation management tools, geographic separation, and spectrum sensing technologies approaches that, as explained above, are not sufficient to protect WMTS devices using Channel 37 from harmful interference.

[15] Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Reply Comments of the WMTS Coalition*, at 26, WT Docket No. 12-268 (filed Jan. 25, 2013) ("WMTS Coalition Comments").

[16] *Id.*

[17] GEHC Reply Comments at 20-21.

[18] Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Reply Comments of Philips Healthcare*, at 5, WT Docket No. 12-268 (filed Jan. 25, 2013) ("Philips Healthcare Comments").

interference could cripple the entire system, resulting in a loss of monitoring for all patients, regardless of their location within the facility.[19]

For hospitals operating near one of the 80 adjacent DTV stations, extensive and expensive filtering technologies are used to mitigate the interference.[20] With widespread adjacent mobile broadband operations, however, the abundance and complexity of the interference issues would multiply many times over and could overwhelm even these hardened systems.[21] And, of course, most healthcare facilities without an active adjacent channel TV station will not have deployed any additional filtering and would be completely vulnerable to interference. As such, mobile handsets transmitting anywhere near Channel 37 could have a ruinous impact on WMTS systems. Worse, many healthcare facilities may not learn of the risk to their Channel 37 WMTS systems until mobile operations are initiated on adjacent channels and their systems begin to fail. With patient safety at risk, the Commission should avoid this problem and adopt the Down from 51 band plan which places mobile uplink operations safely far away from Channel 37.

If the Commission nevertheless adopts a band plan that results in a mobile uplink – either paired or TDD – allocation in close proximity to Channel 37, it should, *at a minimum*, impose an emissions mask that is at least as stringent as the mask currently applicable to unlicensed devices operating between 602-620 MHz,[22] codified in Section 15.709(c)(4) of the Commission's rules.[23] This proposal has received universal support from the WMTS community.[24] As GEHC explained in its comments, the mask, adopted by the Commission in 2008, was the product of diligent collaboration between the WMTS community and the most ardent advocates of unlicensed

[19] GEHC Reply Comments at 21.
[20] *Id.* at 26.
[21] GE Comments at 21.
[22] WMTS Coalition Comments at 29.
[23] 47 C.F.R. § 15.709(c)(4).
[24] *See* WMTS Coalition Comments at 29.

devices, and should be adapted for use in this proceeding.[25] As the Commission has already found those emissions standards adequate and necessary to protect WMTS users, the Commission should have no reservations about applying them to mobile handsets that may transmit near Channel 37 following the 600 MHz forward auction. Alternatively, guard bands around Channel 37 may be required to protect WMTS systems and healthcare patients. Though the exact size of these guard bands would need further study, they would inevitably reduce the amount of spectrum available for auction.

II. THE COMMISSION SHOULD ADOPT THE DOWN FROM 51 BAND PLAN AND ADDITIONAL PROTECTIONS FOR CHANNEL 37

For the reasons discussed above, GEHC urges the Commission to adopt the Down from 51 band plan initially espoused by Verizon, T-Mobile, AT&T, Qualcomm and the National Association of Broadcasters. However, even under this band plan, the Commission should mandate additional protections for Channel 37 WMTS operations.

Adjacent DTV stations already greatly constrain WMTS usage of Channel 37 in certain areas. In response, healthcare facilities have self-mitigated, in some cases developing *de facto* guard bands within Channel 37 by cannibalizing the frequencies available for WMTS use.[26] Hospitals near DTV transmitting stations typically find that more than 20% of Channel 37 is unusable, even after the healthcare facility has deployed protective filtering.[27]

To alleviate the risks of base station interference to WMTS operations, the Commission should first require wireless licensees to coordinate the construction and operation of base stations located within a certain distance of a registered WMTS system, and prohibit wireless

[25] GEHC Reply Comments at 25-26.
[26] Id. at 27.
[27] Philips Healthcare Comments at 4.

licenses from operating the base stations until the affected healthcare facility provides its written consent.[28] Secondly, the Commission should limit the maximum allowable field strength of Part 27 base station fundamental emissions in Channels 36 and 38 to 20 mV/m/MHz (i.e., 86 dBµV/m/MHz), as measured at the perimeter of a registered WMTS facility.[29] Finally, to mitigate the risk of co-channel interference caused by Part 27 base station out of band emissions ("OOBE"), the Commission should require a limit of 10µV/m/100 kHz for Part 27 OOBE within Channel 37.[30]

III. CONCLUSION

GEHC appreciates the opportunity to comment on the Commission's Public Notice and to continue to participate in resolving issues in this proceeding related to Channel 37 WMTS. Given the grave dangers mobile uplink operations near Channel 37 would pose to WMTS devices that have become increasingly vital to healthcare facilities and patient health and safety, GEHC urges the Commission not to adopt the Down from 51 Reversed or the Down from 51 TDD band plans. Instead, GEHC recommends that the Commission follow the growing consensus in favor of the Down from 51 band plan, as well as adopt the Channel 37 coordination requirements and absolute field strength limits discussed above. If, however, the Commission decides to establish a band plan that places mobile uplink operations in close proximity to Channel 37, GEHC urges the Commission to, *at a minimum*, impose an emissions mask that is at least as stringent as the mask currently applicable to unlicensed devices operating between 602-620 MHz.

[28] GEHC Comments at 24.
[29] GEHC Comments, Technical Appendix at 5
[30] *Id.*

Respectfully submitted,

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